Claims

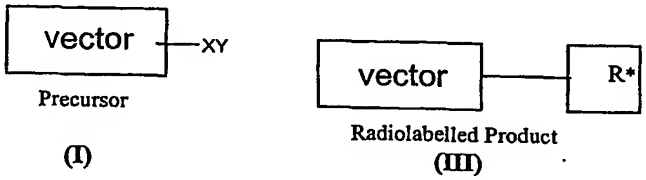
1. A process for purifying a radiolabelled product which comprises use of a solid-support bound scavenger group of formula (IV):

(IV)

wherein Z is a scavenger group and SP is a solid support.

2. A process comprising the steps of:

(a) contacting a solution-phase mixture of a radiolabelled product of formula (III) and excess precursor of formula (I):



wherein XY is a functional group and R* is a radioisotope or radiolabelled portion; with a compound of formula (IV):

(IV)

wherein Z is a scavenger group;

such that the compounds of formulae (IV) and (I) may form a covalent bond to each other;

(b) separation of purified radiolabelled product of formula (III) in the solution phase.

3. A process according to claim 1 or 2 wherein the scavenger group Z is an

isocyanate, isothiocyanate, thiol, hydrazine, hydrazide, aminooxy, 1,3-dipole, aldehyde or ketone.

4. A process according to any of claims 1 to 3 comprising the steps of:

(a) contacting a solution-phase mixture of a radiolabelled product of formula (IIIa) and excess precursor of formula (Ia):

wherein R^1 is C_{1-6} alkyl and R* is [^{11}C]-C_{1-6}alkyl, such as -$^{11}CH_3$ or [^{18}F]fluoro C_{1-6} alkyl or [^{18}F]fluoro C_{6-12} aryl;

with a compound of formula (IVa):

(IVa)

wherein R^2 is oxygen or sulphur

such that the compounds of formulae (IVa) and (Ia) may form a covalent bond to each other; and

(b) separation of purified radiolabelled product of formula (IIIa) in the solution phase.

5. A process according to any of claims 1 to 3 comprising the steps of:

(a) contacting a solution-phase mixture of a radiolabelled product of formula (IIIb) and excess precursor of formula (Ib):

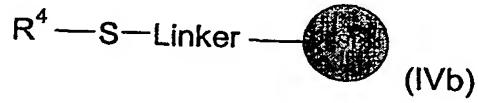
(Ib) (IIIb)

wherein either

(i) the functional group $-X^bY^b$ in the compound of formula (Ib) is $-OSO_2R^3$ wherein R^3 is C_{1-15} alkyl or C_{1-10} alkylaryl and R^3 is optionally substituted by halo (preferably fluoro), for example R^3 is methyl, para-toluene, trifluoromethyl, and R^{*b} in the compound of formula (IIIb) is a radiohalogen such as radiofluoro (for example ^{18}F) or radioiodo (such as ^{123}I, ^{124}I, or ^{125}I) or radiobromo (such as ^{76}Br); or

(ii) the functional group $-X^bY^b$ in the compound of formula (Ib) is $-C(O)CH_2Cl$ and R^{*b} in the compound of formula (IIIb) is $-S\text{-}L^b\text{-}{}^nF$ wherein L^b is a C_{1-30} hydrocarbyl linker group optionally including 1 to 10 heteroatoms;and
^nF is a radioisotope of fluorine such as ^{18}F;

with a compound of formula (IVb):



(IVb)

wherein R^4 is hydrogen;

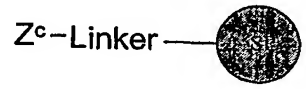
such that the compounds of formulae (IVb) and (Ib) may form a covalent bond to each other;

(b) separation of purified radiolabelled product of formula (IIIb) in the solution phase.

6. A process according to any of claims 1 to 3 comprising the steps of:
(a) contacting a solution-phase mixture of a radiolabelled product of formula (IIIc) and excess precursor of formula (Ic):

(Ic) (IIIc)

wherein the functional group $-X^cY^c$ in the compound of formula (Ic) is an aldehyde or ketone and R^{*c} in the compound of formula (IIIc) is =N-W-Linker-F where W is C_{1-15} alkyl or C_{7-15} aryl, with a compound of formula (IVc):

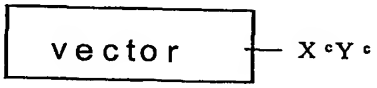


(IVc)

wherein Z^c is selected from $-NH_2$, hydrazine, hydrazide, aminooxy, phenylhydrazines, semicarbazide, or thiosemicarbazide;
such that the compounds of formulae (IVc) and (Ic) may form a covalent bond to each other; and

(b) separation of purified radiolabelled product of formula (IIIc) in the solution phase.

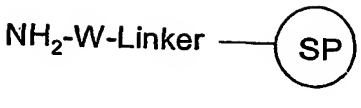
7. A process according to any of claims 1 to 3 comprising the steps of:
(a) contacting a solution-phase mixture of a radiolabelled product of formula (IIIc) and excess precursor of formula (Ic):



(Ic)

(IIIc)

wherein the functional group $-X^cY^c$ in the compound of formula (Ic) is $-OSO_2R^3$ wherein R^3 is C_{1-15} alkyl or C_{1-10} alkylaryl and R^3 is optionally substituted by halo (preferably fluoro), for example R^3 is methyl, para-toluene, trifluoromethyl and R^{*c} in the compound of formula (IIIc) is =N-W-Linker-F where W is C_{1-15} alkyl or C_{7-15} aryl, with a compound of formula (IVci):



(IVci)

where W is selected from C_{1-15} alkyl or C_{7-15} aryl, -NH-, -NH-CO- or –O- ; such that the compounds of formulae (IVci) and (Ic) may form a covalent bond to each other; and

(b) separation of purified radiolabelled product of formula (IIIc) in the solution phase.

8. A process according to any of claims 1 to 3 comprising the steps of:

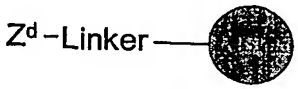
(a) contacting a solution-phase mixture of a radiolabelled product of formula (IIId) and excess precursor of formula (Id):

(Id)

(IIId)

wherein the functional group $-X^dY^d$ in the compound of formula (Id) is an amine, hydrazine, hydrazide , aminooxy, phenylhydrazine, or semicarbazide, thiosemicarbazide group and R^{*d} in the compound of formula (IIId) is =CH-Linker-F where the linker comprises an alkyl, aryl or polyethylene glycol component;

with a compound of formula (IVd):



(IVd)

wherein Z^d is an aldehyde or ketone moiety;
such that the compounds of formulae (IVd) and (Id) may form a covalent bond to each other; and

(b) separation of purified radiolabelled product of formula (IIId) in the solution phase.

9. A process according to claim 8 wherein the compound of formula (IVd) has a ketone scavenging group based on a ring-opening metathesis polymerisation (ROMP) polymer backbone.

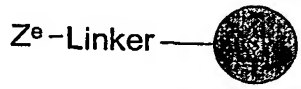
10. A process according to any of claims 1 to 3 comprising the steps of

(a) contacting a solution-phase mixture of a radiolabelled product of formula (IIIe) and a by-product (VIIe):

(VIIe) (IIIe)

wherein the by-product (VIIe) contains an unwanted double bond, formed by an elimination side-reaction, and R^{*e} in the compound of formula (IIIe) is radiohalo, particularly [^{18}F]fluoro;

with a compound of formula (IVe):



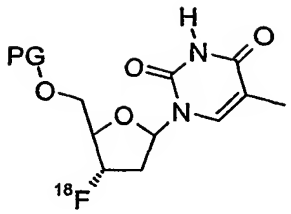
(IVe)

wherein Z^e is a 1,3-dipole such as $-N=N^+=N^-$ or $-C\equiv N^+-O^-$ such that the compounds of formula (IVe) and (VIIe) may form a covalent bond to eachother; and

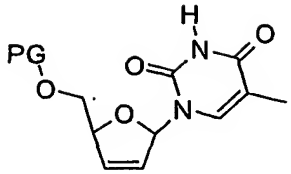
(b) separation of purified radiolabelled product of formula (IIIe) in the solution phase.

11. A process according to claim 10 wherein the compound of formula (IIIe) and

(VIIe) are:



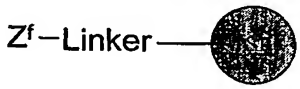
(IIIe)



(VIIe)

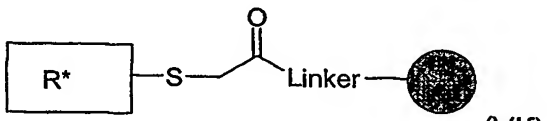
wherein each PG is hydrogen or a hydroxyl protecting group (suitably tert-butoxycarbonyl, benzyl, triphenylmethyl, or dimethoxytriphenylmethyl).

12. A process according to claim 1 which comprises use of a compound of formula (IVf):



(IVf)

wherein Z^f is Cl-CH_2-CO- or another haloacetyl containing moiety for removal of unreacted radiolabelling agent containing a thiol moiety from a reaction mixture resulting in formation of a compound of formula (VIf):



(VIf)

wherein R* is a is a radioisotope or radiolabelled portion.

13. An automated radiosynthesis apparatus, or a cassette therefor, comprising a vessel, such as a cartridge, containing a solid-support bound scavenger group of formula (IV), (IVa), (IVb), (IVc), (IVd), (IVe), or (IVf) as defined in claims 1 to 12.